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ABSTRACT

A review of the literature for the approximate decade from the late sixties to the early seventies shows that the division between academic and vocational education is not considered an advisable one. A need for interdisciplinary integration is expressed together with brief examinations of such attempts. There is a pattern revealed in the literature relating academic and vocational education: first there is a merging of courses within vocational service areas, then an integration of the vocational fields themselves, and finally, an integration of vocational and academic education programs through interdisciplinary programs. Selected program descriptions, research reports, and curriculum guides and manuals identify approaches used. The most promising is the Comprehensive Career Education Model. Together with the four U.S. Office of Education models (school-based, employer-based, home/community-based, and residential-based) a significant social movement is formed. The literature cites numerous examples of programs in various areas using those models. In the future, the process approach will replace old approaches to education. A seventeen-page bibliography concludes the document, including information on ERIC document numbers where available. (AG)

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RELATING ACADEMIC AND VOCATIONAL EDUCATION

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FOREWORD

Implementation of the career education concept has encouraged integration of the academic and vocational aspects of the education program. However, long established funding patterns and traditional social values have made many educators jealous of their discipline and unwilling to cooperate.

The author places in perspective the controversy often existing between the academic and vocational facets of our schools, presents a case for disciplinary integration, and provides several examples of programs demonstrating interdisciplinary organization.

The profession is indebted to Henry A. TenPas for his scholarship in the preparation of this report. Recognition is also due Henry Borow, University of Minnesota; and Gordon Swanson, University of Minnesota for their critical review in the early stages of manuscript development. Wesley E. Budke, Assistant Director for Information Utilization coordinated the publication's development and Alice J. Brown and Paula Kurth provided the technical editing.

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INTRODUCTION

The scope of this paper covers approximately the decade, from the late sixties to the early seventies. Literature was identified through computer searches of the Educational Resources Information Center made by the ERIC Clearinghouse on Vocational and Technical Education at The Ohio State University using subject matter descriptors found in both the academic and vocational domains. The search descriptors included: career education, core curriculum, integrated and interdisciplinary approach. Extensive use was made of documents reported in Research in Education (RIE), Abstracts of Research Materials in Vocational and Technical Education (ARM), and Current Index to Journals in Education (CIJE). Additional information was secured through library investigation, the Encyclopedia of Education, various state research coordinating units, and personal contact with key professionals who contributed materials for inclusion in the review.

A FRAME OF REFERENCE

The educational profession shares the dilemma facing the rest of society of regaining the unity of outlook and control over our destiny, once claimed by man from study of the classic liberal arts, while still retaining the specialized knowledge relevant to today and the future. B. Smith, et al. (1969), in Teachers for the Real World, state this thesis:

> But the search for a general perspective can be surrendered only at the risk of social disaster in a free society. The society. The paradox of our times is this--at the very moment when specialized knowledge and specialized activities are molding men with fragmentary minds and narrow perspectives, man is called upon to see the world as a whole, to see the interdependence of its parts, and to have the insight and prudence to deal with it constructively (1969:117).

There is no simple solution to this paradox. There may, however, be several alternative approaches to a solution. One of the current approaches is to emphasize the role of the disciplines in the education of the individual. An immediately apparent defect of this approach is the lack of provision for integration among the disciplines. Even more vital is a criticism that insists that emphasis upon conceptual content and methods of the disciplines is no guarantee that the basic questions that concern man will be attacked, resolved, or solved. Another alternative, and perhaps the most viable for purposes of this review, is to investigate the research, to study resulting developments, and to report the findings. Charting a sound course on which the

present, the heritage of the past and possibly future, in light of an up-to-date synthesis of research, is the crucial task always facing educators.

The problem of integrating academic and vocational education is dealt with by Wirth (1972) in Education and the Technological Society. He states it as a controversy in the early twentieth century - that the notions of academic and vocational are in conflicting positions and that their respective devotees are likewise in conflict.

The antithesis between academic and vocational education is analyzed by Whitehead:

> The antithesis between a technical and a liberal education is fallacious. There can be no adequate technical education which is not liberal and no liberal education which is not technical; that is, no education which does not impart both technique and intellectual vision. In simpler language, education should turn out the pupil with something he knows well and can do well (1929:58).

Whitehead further warns against separation with the resulting danger of the pursuit of inadequate knowledge.

Wirth (1972) sees the cause of the controversy as the failure of our schools to adapt to industrialzation, or ironically to swing away from the techniques and concepts that made the Industrial Revolution possible. He further delineates the problem as the basic value choices which the American people are forced to make from the resulting pressure which technology causes.

The discrete disciplinary approach to integration of learning is clearly visible in the process of teacher preparation. The process of teacher preparation ordinarily begins with the subject matter of one or more disciplines. The prospective teacher is thus immediately faced with a lack of relatedness between the subject he is preparing to teach and the laws of learning he encounters in the pedagogical phases of his preparation.

Dewey (Lucio, 1963) was opposed to any isolation of cognitive experience and its subject matter. As America's leading educational philosopher, he was a foremost apostle of the essential union of not only the academic and vocational, or the subject and the process of learning, but also the individual and his social setting. Intelligent action in social areas is what matters. He states:

> I believe finnally that education must be conceived as a continuing reconstruction of experience; that the process and the goal of education are one and the same thing.

From Dewey and Whitehead, to the last decade, the concern is both process and content as academic and vocational are related in education.

Academic in one sense pertains to the liberal arts fields of English, foreign lanugages, history, economics, mathematics and science; and to the realm of ideas or abstractions.

Vocational may pertain to certain federally reimbursed service areas such as agriculture and home economics, to a vocation or occupation, and to a person's mission or life pursuit.

A discipline is an area of inquiry containing a distinctive body of concepts and principles with techniques for exploring this area in order to examine and correct the body of knowledge. It is the purpose of a discipline to describe a small portion of the world's reality. The descriptive and analytical tools of the discipline that are consistent with described reality offer a common ground on which to relate two prescribed areas, be they academic or vocational.

A field may be distinct from a discipline in that it may be made up from several disciplines. The field of education, for example, contains and utilizes content from the allied disciplines of psychology, philosophy, history, sociology, anthropology, and, at times, economics.

The term subject matter is used in various ways by educational specialists. The terms subject matter and content will be used interchangeably and refer to the content of the disciplines offered in the curricula of four-year high schools or colleges.

Career, when used in the singular, refers to an occupation or a profession for which one undertakes special training and in which one is engaged for remuneration and personal satisfaction. When multiple reference is made to careers, the term pertains to the several life roles of individuals: family, citizenship, economic, avocational and aesthetic-ethical.

Pragmatism is the belief that a value has its meaning in terms of its effect; in education, this effect relates most critically to group life.

Integration is the process or practice of combining different school subjects and presenting them as aspects of a unifying project or activity; for example, teaching geography, history, art, English, and arithmetic in connection with a study of the Panama Canal (Good, 1959).

NEED FOR INTERDISCIPLINARY INTEGRATION

Literature in vocational education in the sixties implies that integration by interdisciplinary techniques and/or by the multi-disciplinary approach improves instruction. The past has shown that subject fusion usually precedes more complex relationships.

Aarnes (1961) maintains that the teaching profession must unify all levels. The growing needs of education, particularly in industry, point toward a combination of the liberal and the technical in education centers. The centers should be culture-oriented, featuring national and international views in addition to combining types of offerings.

Dauwalder (1963), after carefully examining the needs of industry through personal interviews, found that the present program of vocational education is inadequate. This inadequacy results from over-emphasis on the academic, lack of funds, and poor attitudes on the part of the academic community.

Broudy (1965), in refuting a system which stresses either general or vocational education, laments the lack of time given in secondary education to train students to the skill level demanded in industry. General education must lay the groundwork for more sophisticated uses of knowledge as well as teach students to learn and make application of the products of learning. With the sophistication of modern industry and society, vocational education must also become more sophisticated, more forward-looking, and more consciously based in theory.

A comparative study of present practices and future trends in the United States and in nine European countries identifies the attempt to integrate secondary school vocational education into general education as being important along with easy transfer of technical students between secondary and the university, and increasing cooperation between industry and education (H. Warren, 1967).

Bergstrom (1966) conducted a study to determine if pre-work education of both general and vocational nature had any effect on later job success. His findings indicated that the more specific the training, the less relevant it is to actual job-related needs. No indicative consistency was found between classwork in school and work on the job. Employers listed communication competency, personal adequacy, and skills unique to the job as the characteristics they valued most in employees.

An Advisory Council on Vocational Education (1968) recommended a unified system of vocational education. The report predicted a marriage of general education and vocational education, and listed five operational principles applicable toward such integration. The report is based on extended deliberations including both general and vocational educators, as well as a number of non-educators. The unified system advocated by the group has key components encompassing a range from elementary school to post-secondary and from within the school setting to a wide utilization of community resources outside the school. The objective of vocational education, as stated, is the individual.

The 1968 Amendments to the Vocational Education Act are based on the council's recommendations for more power and money, better relationships with industry, joining of general and vocational educational effort, and new programs for the disadvantaged. The necessity for integration between academic and vocational education is recognized and provided for in both the council's recommendations and the legislation which followed.

There are some who propose that the comprehensive school is the solution to the demands for both high quality skills preparation and overall preparation for citizenship. A few advocate more specialization and separation of vocational and academic education. Bissel, et al. (1965) report that for Ontario, Canada, the American comprehensive community college is not the answer. Specialized interests and specialized schools are recommended instead. The integration of academic and vocational education is not considered a possibility.

As indicated by Bissell, et al. (1965), the search of literature reveals some studies which support the separation of vocational and academic education and further specialization within vocational education. However, the majority of authors indicate a need to relate and integrate academic and vocational education.

PATTERNS OF SCHOOL ORGANIZATION
AND
PRECURSORS OF CAREER EDUCATION

Literature reveals a pattern relating academic and vocational education. This pattern begins with a merging of the subjects within the vocational areas. For example, agricultural education incorporated the broad area of off-farm services designated as agribusiness. Problems encountered in this broad field encouraged several subject areas to combine their knowledge and techniques. Teachers of agriculture at the secondary level utilized the combined efforts of agricultural economists and agricultural scientist. The expertise of the economist, scientist, and educator was integrated to solve the problems found in the field of agribusiness.

Merging of courses within vocational areas was followed by more comprehensive melding between fields, often called interdisciplinary in the early attempts. The sequence of integration within courses, then between courses, between fields, and finally between academic and vocational disciplines, resulted in new patterns of organizations. Most of the literature of this section chronicles past attempts to synthesize, mostly by making organizational changes with curriculum modifications. These attempts are the precursors of process orientations, which are examined in the next section.

The literature addressing patterns of school organization shows a collection of subjects, areas, and disciplines which attempt to fuse, relate, and integrate. One could argue that education is by definition interdisciplinary; some validation of this is evident in the process orientation.

By viewing the relationship between academic and vocational education as a focus of school organizations, one can see the chronologically separate courses and facilities preceding the more comprehensive attempts at integration. There are patterns of cooperation between individuals representing what had been different subject areas and cooperative arrangements between public and private agencies. Even though closeness has not always meant integration, that which occurred in the vocational areas is but a reflection of the comprehensiveness of disciplines illustrated by the community college concept. As the process evolves in school organization, the terms <u>interdisciplinary</u> and <u>multidisciplinary</u> gain more comprehensive meanings and reflect larger cooperative efforts in subjects, fields, and problem solving.

Integrating Vocational Education Programs

The first step toward interdisciplinary education is a merging of courses within vocational service areas followed by an integration of the vocational fields themselves. This section identifies several of the integration efforts within vocational education.

A University of Kentucky seminar for supervisors and teacher educators of persons with special needs recommended shifting education to the learner through individualized instruction. Van Tassel (1967), in a summary of the guidelines emerging from the seminar, stressed that vocational education should become more concerned with people and less with programs, and that vocational education has far more to offer persons with special needs than does any other course of study.

A study for Franklin High School, Somerset, New Jersey (1965) gave program guidelines for initiating a "purposeful education" of basic occupational skills on a semi-skilled vocational level, particularly designed for students whose developmental needs are unmet, and who leave school prematurely within adequate job skills. Included in the study are sections on philosophy, objectives, purpose, pupil selection, guidance, and role of personnel. One of the major points indicates that as the real needs of the students are descovered, the program should simultaneously be developed.

Numerous new patterns emerge to break old molds. Industrial Mechanics Cluster - Objectives, Elements, Assessment, Performance Expections is an example of a teacher assistance team effort. G. Warren (1972), working with a team, developed a model and assessment. One of the project's eight objectives was to instruct individuals in supportive disciplines, e.g., industrial mathematics, science, language arts, and graphic communications required by industries in the mechanical field.

In "Curriculum Relevancy and Work" (1967), the idea of transferring students to a full-time work experience for an extended period is seen as an answer for the unmotivated school youth. Trained vocational education and academic teachers would be assigned to the work sites in an effort to create an integrated curriculum that would have meaning for students at the work location. Other plans that have been used to put meaning and holding power into the educational program are: comprehensive high schools, field trips, core curriculums, and intensive guidance. Again, the thrust for the in-plant education would be to put a central motive or core into the students' program around which would evolve general education essentials.

Bender and Halterman (1965) determined the educational needs of agricultural engineering technicians in Ohio by sampling some firms and businesses. The study indicated that job diversity is needed, given the multi-purpose and various activities of most firms.

Bohn (1967), at San Jose State College in California, updated industrial education teachers through a summer program. Ninety-six teachers were sent to intern at appropriate industrial schools. Objectives included the development of models for industry-school cooperative programs and the integration of instruction on industrial materials, cybernetics, and automation.

A core curriculum common to nurses aides, practical nurses, and surgical technicians was recommended by Kishkunas (1967). This curriculum was demonstrated, tested, and the model recommended on the basis of performance tests during the demonstration programs. Kishkunas" later report includes appendices ranging from the schematic representation of curriculum development to the instruments used and competency rating forms for on-the-job performance.

A team teaching approach is one method for providing integration within vocational education. Holloway (1967), in a study of a cooperative vocational education programs, reports that individualization of instruction for cooperative vocational education is facilitated by dividing students into traditional sub-groups as distributive education and diversified occupations. To students who are at the lower end of the socioeconomic scale, vocational experience is the major requirement in reording the academic subjects around vocational education.

Thomas (1968) reported the need to undertake interdisciplinary discussions of problems associated with vocational and technical education in order to improve educational opportunities for non-metropolitan area vocational students. The rationale for this approach included: 1) Change affecting town and rural residents, 2) Changes related to job opportunities, school tax burdens, and forced occupational and geographic migration, 3) Substitution of capital for labor in farm and industry, drastically decreasing the opportunity for labor utilization in rural areas, 4) Reduced farming opportunities, increasing the need for nonagricultural vocational education, 5) Small towns and rural areas becoming oversupplied with social institutions designed for less mobile, more agrarian, and more populous areas of a recent past, and 6) Questions being raised about the need for consolidation of local governments, businesses, churches, educational structures, and local community services.

Following a three year pilot program by a team of teachers engaged in an interdisciplinary approach to vocational education, Agan, et al. (1968) suggested an individual teaching approach as well as a team approach. Five hundred local occupations were surveyed and employment opportunities and competencies identified. Using this information, "Commonalities in Occupations" (junior year) and "Experiences in Occupations" (senior year) were developed. Eighty-five percent of the students completing both years of the interdisciplinary program planned to continue working for the same employer.

Johnson (1969) reported that the Interdisciplinary Workshop for Special Education and Vocational Education Teachers provided professionally trained educators in special education and vocational education who could work as a team in designing programs for educable mentally retarded students. Attitudes, guidelines, and materials were created and designed in these cooperative planning sessions.

Leporini, et al. (1970) identified clusters or sub-families of common knowledge and skills related to the woodworking occupations which can be incorporated in criterion tests based on behavioral objectives.

The Fourth Annual National Vocational-Technical Teacher Education Seminar Report (Ferguson, 1971) includes a presentation by Cotrell, emphasizing performance based on core concepts in modifying teacher education curricula.

The Georgia Project, directed by Bottoms and Matheny (1969), trains teacher coordinators to implement the cluster approach to vocational education in school systems throughout the state. The program, in its second year of operation, involves 40 school systems, each of which has a dropout rate higher than the state average. The authors report:

> Students participating in the program are those who have been identified as being the most likely to drop out. These are the kids who have the highest absentee rate and who are the worst discipline problems. In the past year, there has been a 48 percent reduction in their absenteeism and the discipline problems have dropped below the norm.

Integrating Vocational and Academic Education Programs

Numerous instances of interdisciplinary education have occurred within the past 10 years. The program descriptions, research reports, and curriculum guides and manuals which follow identify approaches

taken to combine academic and vocational.

A multidisciplinary approach can be used to emphasize education for living as well as education for earning a living. In the booklet "Vocational Education for American Youth" (AVA, 1964), the point is made that students need useful general and specific occupational training.

Reynolds, et al. (1964) prepared a guide for elementary grade teachers entitled Guiding Children Through the Socical Studies. The guide's intent is to enable teachers and, hence, their students "to discern coherence, continuity, and preciseness in the study of human affairs." It reflects on interdisciplinary approach and a multidimensional study of home and community.

Hodgson and Laws (1965) designed a two-fold integrated program. The goals were 1) to prepare vocational teachers to participate as instructors in a prevocational occupational program for rural underachieving junior high school students, and 2) to test a prevocational occupational core curriculum. The results indicated that vocational teachers can be oriented to the needs of the disadvantaged. Further, the program showed that disadvantaged students can be motivated through a prevocational curriculum revolving around the study of specific occupations and through vocational teachers using their knowledge about skilled and semi-skilled occupations.

Joseph R. Smith (1966) breaks down major public school education goals as general education for self-realization, occupational education for economic efficiency, citizenship education, homemaking education, special education for individual and community problems, and recreational education. A multidisciplinary approach is implied.

A team teaching, interdisciplinary approach to subject matter was initiated as a method to upgrade the education of the general student and give him a sense of direction and commitment. The Ford Foundation (1967) and the City Board of Education, Brooklyn, N. Y. organized in nine schools a program of exploratory courses for grades 9 and 10 in business, health, and industry. Specialization in one broad area occurred in grades 11 and 12. The 13th and 14th years were devoted to preparatory education for those who wished to continue, plus a counseling and placement activity, all geared to orient education around student career preparation.

By using computers to insure more flexibility and improve vocational elements in the general curricula, and to encourage the use of performance criteria, the Stanford project staff sought to demonstrate

that the vocational curriculum can be improved (Allen, 1967). One aspect of the project included information on an interdisciplinary approach for teaching power machanics using coordinated learning activities in science, mathematics, and English.

The Texas Education Agency, Austin, Department of Vocational Education (1968), reported a program which includes a combination of vocational and modified academic instruction. This program provides the educational opportunity to acquire a saleable vocational skill while also achieving basic knowledge in the fields of mathematics, science, English, and social studies.

Utilizing the same problematic approach as the Stanford project a Ford Foundation project at Central Michigan University (1967) correlated the disciplines of English, industrial education, mathematics, and science with vocational education as the basis for problem studies. Flexible staff, time, and curriculum arrangement offer students a less fragmented approach to real world problems.

Tuckman (1968) states that the ultimate development of an integrated curriculum will necessitate developing and refining a scheme, testing the scheme on both subject matter and real life experiences, and utilizing existing resources in vocational education to a greater extent. Tuckman attempts group learning experiences based on process rather than subject matter. The major advantage to such a curriculum is the resulting improved occupational relevance of subject matter material. It is expected that this approach will be utilized for occupational preparation.

The Report of the Advisory Council on Vocational Education (1968) lists three basic concepts of education for employment. A major tenet is that vocational and academic education can no longer be compartmentalized. The three basic concepts are: 1) vocational education should be the basic objective of all education, 2) technological and economic progress demand change, and finally, 3) the freedom of opportunity is measured by the individual range of choice. The report suggests that vocational education must not be limited to particular skills.

The EHOVE Board of Education (1968) submitted a plan to correlate curriculum developed around the "world of work" by guidance, academic and vocational areas. Under this plan, the correlated curriculum is developed around basic problems of life, students, counselors, teachers, supervisors, consultants, and business representatives, and involves the identification of life problems.

Colorado State University (1969) and the Rocky Mountain Education Laboratory designed a project to enhance the career education being provided to students by influencing work relevant attitudes, concepts, and information through junior high school teachers and principals.

A manual developed by an elementary teacher offers a rationale for, and methods of, integrating industrial arts into the elementary school curriculum (Boily, n.d.). One approach uses the hammer and hand drill as tools to instigate handicraft activities in such subjects as science, mathematics, language arts, social studies, music, and art. Consequently, the making of various projects suggests a multidisciplinary approach to learning.

Light (1969), in a speech presented at the Annual Congress on Medical Education, discussed the factor of legitimate specialization versus fragmentation. He also stressed the cooperation of medical specialists and professional educators in approaching curriculum construction as a problem area requiring intimate collaboration between medical leaders and professional educators.

Walton (1969) prepared the second annual report and evaluation of the Talent Corps College for Human Services. This action-oriented training institute, established in 1964 to train persons from the low income areas of New York City for paraprofessional careers in community agencies, developed, refined, and tested a core curriculum in the human services. Intellectually limited and educationally handicapped 10th graders were given an academic core of English, citizenship, and math, blended with classes in one vocational education/career education area.

The Rocky Mountain Educational Laboratory (Colgan, et al., 1969) at Greeley, Colorado, conducted a health occupation curriculum development effort, structured to provide broad exploratory activities for the total student body, and elective course, orientation to employment, and work entry experience in the 11th and 12th grades. The project provided a transferable prototype for rural school systems.

The Minnesota State Advisory Council for Vocational Education (1970) recommends that all education must meet the needs, interests, and abilities of the individual. The council suggests that vocational education has to be built on long term, basic educational skill development including reading, writing, and arithmetic.

TenPas applies Commissioner Marland's (1972) article on career education in Teacher's Edition: My Weekly Reader to her classes in teaching about the world of work.

The M. H. Russell Center for Economics Education (1968) published three basic concepts of education for employment. 1) Vocational and academic education can no longer be compartmentalized. Education is mandatory for employment in modern society; vocational education should be the basic objective of all education. 2) Technological and economic progress demand change. 3) Freedom of opportunity is measured by the individual range of choice; education can increase this range. Several principles are implied in these concepts, including a unified system of vocational education as essential. It should begin in the lowest grades and continue throughout the educational experience. The curriculum should spiral in that subject matter begun on one level ought not be abandoned but developed further on each higher school level, and post-secondary occupational education should be a goal.

Emerging Educational Patterns

The Comprehensive Career Education Model (CCEM) seems to be the most promising emerging pattern in public schools, area technical programs, industry and private schools and community colleges. The Comprehensive Career Education Model (Reinhart, 1972) is the most practical and largest educational movement ever attempted to orient education to the learner and to integrate academic and vocational education. Four education models have been sponsored by the U. S. Office of Education. They are: the school-based model, the employer-based model, the home/community-based model, and the residential-based model. Together these form a social movement of great significance and magnitude.

The school-based model will structure curriculum in grades K-14 around a career development theme. The program will, among other provisions: 1) Provide extensive community, business and industrial involvement, 2) Make widespread use of cooperative education, 3) Stress placement of every departing student in either a job or further education.

The employer-based model includes within its scope the following goals: 1) To provide an alternative educational programs for students, ages 13-18, in an employer-based setting, 2) To unify the positive elements of academic, general and vocational curricula into a comprehensive career education program, 3) To increase the relevance of the world of education to the world of work, 4) To broaden the bias of community participation, particularly by involving public and private employers more directly and significantly in education. The program will be operated by a consortia of employers (Muirhead, 1971:3).

The home/community-based model has three major components: 1) A career-oriented educational television program with motivations to study for a career, and information concerning opportunities, 2) Home and community-centered educational systems, using such media as cable television, audio cassettes, correspondence programs, radio and instructional aides, 3) Career clinics in the community to provide career guidance and counseling, referral services, and information on relevant career-oriented educational programs (Muirhead, 1971:3).

There is also a residential-based model.

> The Mountain Plans Regional Education Center, recently established at the Glasgow, Montana, Air Force Base, will develop and begin to implement a residential career educational program with services to disadvantaged individuals and their families drawn from rural areas of six participating states which are seeking to develop their economies. Family units will be brought to the training site so that each family member can develop an appropriate career role through employment, study, home management, or a combination of these methods. Employment upon completion of the residency is guaranteed by the home state of each family.

As special needs of specific groups call for a new pattern to deal with unique needs, more power and money, better relationships with industry, general education, and other training programs for the disadvantaged will have to be initiated through vocational education.

Influences upon the curriculum are many and, more and more, the learner, rather than the teacher, is the primary focus of attention in the classroom. Many of the new learning materials are self-instructional, with the teacher being utilized in a role as a learner consultant rather than as a lecturer. Self-correcting materials with immediate access to results characterize these new learning materials (Berman, 1968).

The individualized continual progress strategy, which is being advocated and implemented in various locations and at various levels across the country, is one of the forces pressuring education to change. It brings with it the promise of self-pacing, as well as the self-sequencing aspect of instructional goal attainment. The learner makes his own decisions with regard to the learning goals which he places before himself. Thus, he is more responsible for his destiny than were his counterparts of the past (Courtney and Stevenson, 1971). At the same time, increased flexibility in scheduling, which assists the individualizing process, moves the total school toward an ungraded type of arrangement. This arrangement is similar in structure and

organization to the "one-room" school house of the distant past, but with a vastly different curriculum.

The implementation of the continual progress strategy has not come without its problems. Drastic changes within our educational system have always caused transition difficulties. However, like the society itself, which is now and will continue to be in the throes of change the school of the future must prepare the future citizen for living with and adjusting to change. Academic and vocational education will no doubt lose their respective curricular identities and will blend into something different in the future which will be reflected by schools as they adjust to the change.

One rather promising line toward the solution of the problem of future adjustment of the citizenry would certainly seem to be education for life in an electronic society. Yet, it would appear that our present educational system is still largely educating people for the kind of world that existed prior to 1950. Our universities are still turning out teachers who perceive their roles as being dominators of learners. In contrast, the teacher of the future will necessarily be an affectively-oriented person whose major role will be to facilitate, rather than dictate, learning experiences. Like the tideland animal, he will be characterized as being very flexible and quite adaptive to his changing environment. He will reflect the changing society of which he is a part (Courtney, 1972).

Associated with people adaptability is our persistent notion that a person can acquire in the first twenty years or so of his life all of the formal education he will need throughout his life. We forget too soon that the initial bit of formal schooling which we receive is only a vehicle, not a final destination in our lives. It does now seem apparent that a system of universal and life-long education will have to be devised (Courtney, 1972). Career education is an answer. The career education concept is completely compatible with the continual progress curriculum idea, meshing academic and vocational offerings under this emphasis.

Precursors of career education seem to have commonalities with respect to academic combinations, goals orientation, the process approach, and facilities. A review of research in these areas indicate that interdisciplinary techniques are numerous.

Skills - Academic Combinations. The literature indicates that a combination of vocational and academic education in a school or community setting can only take place by conscious efforts of curricula synthesization. The process of our educational methods often indicate

whether the method is the meaning or if the meaning must come in spite of the method.

With the wide-spread insistance on accountability through the measurement of achieving performance objectives, experiences and resources must find their righful perspective. Therefore, it becomes critical to examine those techniques which would "work" the curriculum to best serve the objectives of students in career education, and which bring the synthesis of all education around the emerging career needs of students. The curriculum synthesizing is usually student centered, even though not always adequate for meeting the education objective(s).

The Block Teaching Project (Kreisman, 1969) brought together 100 students and seven faculty members, covering six areas of subject matter for a total of 12 credit hours per quarter for three quarters. History, literature, composition, art, music, and speech subject matter was correlated and integrated. The researchers concluded that the use of block method does not result in educational loss, and the administrative advantage plus results heavily favor the block group.

The interdisciplinary approach to "vocademic" education assumes supportive activities will be used within a specific discipline. For exampel, technical education programs must provide comprehensive student personnel services and the like.

In 1964, the Southern Regional Education Board (1964), in the proceedings of annual legislative work, questioned the system's adaptability to changes in student plans, asked what contributions were being made in regard to the prestige of technical education, and also acknowledged the importance of general education. The conference also called for articulation among educational levels and the provisions for comprehensive student personnel services, as well as coordination with agencies outside the school.

The Acalanes Union High School District, California, (1965) developed an English curriculum for grades 9-12, attempting to give unity and sequence to the development of language skills and concepts by making this study of language the core discipline. Language is integrated with composition and literature studies; each part of the curriculum is designed to complement and reinforce the others.

Shave and Oliver (1965) asked, "Can a structure be created that provides a broader and more valid base for the general education curriculum in the social studies than would the structure of social science disciplines?" In their work, they recommend a structure and conclude it to be clear that a citizenship education curriculum must

be based on more than the structure of the social sciences, and must be developed at a level above that of the individual course (including ethics, logic, and humanities).

Devore (1966) states the need for eliminating curriculum confusion and proposes that industrial arts curriculum should be based on the concept of man as a creator of technology. The principle of discipline structure can be maintained. General education is offered as a means of defining taxonomy to serve curriculum planning. The major technical areas are identified as production, communication, and transportation. "Programs rather than isolated courses are possible..."

In an increasingly complex, automated world, Jamochian (1966) assigns a growing importance to postsecondary vocational education. Only part of human problems are resolved with specialized vocational training. Psychological, social, political, and moral needs remain untouched. Liberal education has more than a specialized role to play. It must help people lead more satisfying lives by showing them relationships and wholes, and studying the rationale of the scientific method within technical processes.

In adult education in Great Britain, trends indicate that in higher education many of the distinctions between vocational and non-vocational programs are being eliminated. Local education tends to be geared to leisure time interests, while the university provides liberal studies. The pattern is clearly changing to be a little of each in both.

Israel emphasizes that young adults will take a liberal and vocational one-year course spread over three years so that the abstract can be merged with work. Theories are assessed on the criteria of ensuing values of labor, equality, collectivism, protective colonization, and international solidarity through the synthesis of vocational and liberal studies.

Students in the areas of business and industrial arts may also get "consumer mathematics" by concrete examples, applications and visual material within the vocational education courses. Winget (1966) states that two areas may be combined by their commonality. By assessing possible interdisciplinary opportunities as either "common learnings" or "special learnings", unity is an expected result among the various vocational education areas. "Special Learnings" include additional study of fundamental operations of the general group. "Common learnings" for all groups include such things as fundamental operations with rational numbers, and graphs and statistics.

As early as 1966, The Greater Cleveland Curriculum Plan presented sequential English programs for a restructured curriculum (grades 7-12) (Educational Research Council of American, 1966). These programs cover areas of language, literature, and composition (including speech, reading, and related communication skills). Grade level grids and variation in teaching for individual instruction and interdisciplinary study are available through the Research Council.

Nursing associate arts degrees are characterized by comparable uniqueness in programs leading to that degree. The National League for Nursing (1907) reports that high school graduation is required, the program is similar in cost to that of other junior college programs; they are conducted by junior colleges; and that nursing theory and practice are combined with general education courses. Given the aim to educate for licensing registered nurses, it might be assumed that general education is integrated within the main task of nursing preparation.

According to Kaplan's (1967) survey on occupational training centers for 16-18 year-old potential dropouts, "individually oriented, occupational training with supportive emphasis on academic skills would be the best way to hold possible dropouts in school." The survey task force recommended that two demonstration centers be developed.

An educational development plan for the Kapoilani Community College (Nakamoto, et. al., January, 1967) indicates a comprehensive coverage of present curricula and facilities for courses in traditional areas of vocational and general education. Proposed future development would initiate programs for general education, transfer, occupational, continuing education, and a special course for special students. The report does not indicate a breaking away from existing curricular structure.

Clemons (1967) suggests the ideal situation to teach English as a second language in the education of the bilingual child would be an integrated studies program wherein teachers from all disciplines would work together.

Allen (1967) suggests computer scheduling as a means of providing flexibility for vocational education in a progress report of a two-year project. This includes the use of performance criteria to measure student achievement. An interdisciplinary approach to teaching power mechanics with coordinated learning activities in science, mathematics, and English is included, as well as discussions of a conference to examine the relationship between social science and vocational education.

Lazarus (1967) of Purdue University conducted "Project English at Purdue." The final report produced 14 "opus-centered" units integrating studies of literature, language and composition; field testing in reading, writing, speaking, listening, and reasoning involved over 1,800 Indiana, Kentucky, and Ohio seventh graders ranging in IQ's from 80 to 130, from all ability levels, except readers retarded more than three years below their grade.

To prepare citizens to be wise consumers, a course was developed by a team of teacher consultants and curriculum specialists, Bregman, et al. (1967). The multi-disciplinary course would be offered in grade 12, untilizing the effort of social studies, business education, home economics, health education, and industrial arts. No fixed materials or specific boundaries had to be covered or lived within. Student interests and needs were the chief criteria for subject matter, and team teaching and planning were critical. Ten unit subjects were suggested ranging from principles of consumer purchasing to consumer law.

McLaughlin (1967) states that schools must refuse to contribute to this age of "information overload" and, through interdisciplinary approach, assist students to become receptive to humane feelings and to understand the complexities of a culture. To those ends, educators must "re-program" the entire educational system, relinquishing their attachment to their own disciplines by uniting the subject matter of English. social studies, art and science, and through large group seminars.

In her report presented at the annual conference of the Southwest Council of Foreign Language Teachers, (Texas) Komadina (1967) stated the past decade had been an eventful one in the area of teaching foreign language. The elementary schools have undertaken experimentation with interdisicplinary studies involving foreign language to provide student choice as to several subjects and the earning of credit in subjects forming the content.

Plant facilities for vocational education often prejudge a program. Any academic subject can be related to vocational education and the need to fuse the two curriculums is needed. New and special equipment can play major roles in facilitating programs, particularly building design and the use of audio visual techniques.

On The Way To Work. Kohn, Olfson, and Harris (1969) reports on five schools which have used plant design to meet vocational-academic philosophical points of view with actual facilities. The challenges for plant design ranged from the need by a community college for an

orientation to educational-occupational opportunity "rather than unimaginative skill or job training".

The Quincy Vocational-Technical School wanted a facility united to a particular curriculum. Southern Nevada Vocational-Technical Center wanted a flexible facility that could be added to without expensive allocations.

Kenosha Technical Institute wanted a functional, coherent unit, rather than a separated group of training centers.

In each case, the plant design met these challenges and provided facilities that allowed philosophical needs to be met.

Gallington (1966), through Bruce Publishing Company of Milwaukee, Wisconsin, reports a space concept for new approaches in industrial arts. The purpose of the accompanying design concept is to stimulate a full measure of interdisciplinary participation among teachers of industrial arts who may fancy the idea of "straddling" the fictitious barriers between industrial areas and disciplinary specialties. The thesis is that industrial arts is to suffer much change in the immediate future if it is to survive. Recommendations include the establishment of a versatile learning laboratory and team teaching.

Nangle (1967), in reporting for The Center for Vocational and Technical Education at The Ohio State University on the subject of Health Occupations Education Centers, seminared interdisciplinary teaching as one of the approaches. The approach recognizes that common understandings are required by all health workers, that interdisciplinary teaching is possible, that centralized equipment and service could be available to all the students, and that the educational effort could be in a setting which perceives the relationship among the various kinds of preparation rather than the separateness of each course.

The co-mingling of vocational-technical students with liberal arts students will be encouraged both by philosophy and the physical plant in Nicolet College and Technical Institute in Rhinelander, Wisconsin (1969). Open-plant concept and six-structure complex of curriculum will be the two chief methods of implementation.

A major parameter to develop vocational education was seen in the physical plant design by Southwestern Community College (1968).

Many are the arrangements of academic combinations. The Division of Vocational Education in New Mexico (New Mexico State Department of

Education, 1968) established its position concerning the differences between general, vocational, and pre-vocational education. They mainly utilize charts as their medium for showing possible sequential courses for training programs which define the relationship between general, pre-vocational and vocational education. The definitions are applied to agriculture, distributive education, and to trade and industry at the secondary level.

Lodge, et al. (1968) state (concerning skills) that, among other things, the teaching of English as a discipline is not accomplished through curricula which separate composition of literature but rather through concentration on utilitarian, artistic, and imaginative uses of language, composition and literature and through the teacher's responsiveness to new materials, new methods, research and experimentation.

The advisability of separate academic and vocational schools was one of eight issues concerning 33 participants with experience in 15 countries meeting at a workshop on occupational education and training at Stanford University. A major topic was the interrelationships of general and occupational education as well as work in curriculum development, organization, agricultural and rural aspects, and frontiers for action in occupational education (Alexander-Frutschi, 1968).

The Memphis City School System (1968) published a guide to help teachers develop sequential, relevant, and unified teaching units in the areas. One set of materials dealt with the general objectives, principles, and problems of an interdisciplinary approach.

The hypothesis that a certain core of knowledge is commonly useful in 12 allied health occupations was proposed, tested, and supported in a publication of the Washington State Coordinating Council for Occupational Education (Wallenstein, 1968). The areas of various sciences, psychology, and sociology were rated on a scale by 48 instructors and 41 practitioners. Groups of knowledges considered essential, or helpful, or not needed are available.

The Coordinated Vocational-Academic Education (CVAE) Program is designed for students with special learning needs (Texas Education Agency, 1968). The program includes a combination of vocational and modified academic instruction providing dual educational opportunities of acquiring a saleable vocational skill while also acquiring basic knowledge in the fields of mathematics, science, English, and social studies. It is intended for in-school youth possessing academic socioeconomics, or other handicaps to such an extent as to prevent them from succeeding in standard educational endeavors.

In two separate projects at the University of Texas, Gill and Conroy (1968a, 1968b) dealt with contemporary America and Latin A America. These curriculum projects stress the multidisciplinary approach through which students are expected to gain experience in reading, analysis, research technique, critical thinking, and opinion formation and articulation. The suggested activities stress inquiry and reflective thinking through class discussion questions. These are part of a sequence of materials developed by the Latin American curriculum Project with the senior elective course on contemporary America designed as a capstone to previous sequential units.

Thomas (1968) gives the rationale for the interdisciplinary attack in the main final report. Bush, et al. (1969) present a career planning approach which integrates educational experiences with the world of work and job requirements.

Another approach to integration of experience within course confines is reported by Moore (1969). English engineering apprentices were sent back to school for blocks of one or more periods, focusing on educational achievement. The evidence for the study is inconclusive; the block release apprentices were more able in general.

An alternative is the Area Learning Center at Grand Rapids, Michigan (Kent Intermediate School District, 1969). The report covers three years activity and discussions of interdisciplinary approaches.

Stahly, et al. (1969) present five papers which focus on general strategies or methodologies of instruction rather than specific subject content and present an interdisciplinary approach in psychology, science, language arts, mathematics, and social studies. These compare and contrast traditional and emerging models and stress need for an inquiry-oriented, experience-based curriculum.

Mersand (1969) states that correlation, fusion, integration, and core in the English program originated in the 1930's and have been found to increase the student's breadth of knowledge and appreciation of literature. Basically, such curriculum structuring utilizes three approaches; the joint study of two or more subjects (often literature and history), the use of a broad thematic approach, and the treatment of social problems through diverse disciplines. Advantages of curriculum structuring include greater individual attention and lessening of the pressure and confinement for students, greater opportunity for experimentation, stimulation of students, mastery of skills and work habits, student cooperation, and self-discipline.

Johnson (1969) reported on an interdisciplinary workshop for

special education and vocational education teachers which was designed to find means for professionally trained educators in special education and vocational education to work as a team for program design for educable mentally retarded students. Attitudes, guidelines and materials were created and designed by these cooperative planning sessions.

Faux and Larsen (1969) found that language skills should be taught in an integrated curriculum that combines usage, composition, literature, reading, and spelling. They also recommend integrated curricula between teachers of English and teachers of science, history, health, and home economics.

Manchel and Clark (1969) suggest ways in which writing can be integrated with other academic studies at the secondary school level. An example of a creative writing assignment that combines humanities and social studies is entitled Gandhi in the 1930"s: An Example of Creative Historical Research (Bailey, 1970). Derrick (1970) designed materials to knit together strands from several disciplines and methodologies to show that every teacher can be a language teacher.

Low motivation for either vocational and/or academic programs seems to be a difficulty in Manpower Problems in Appalachia (Zeller and Smith, 1970). In this book , Zeller and Smith suggest that one possible solution toward effecting motivation is through an interdisciplinary approach.

A general woodworking core curriculum, ABLE, serves as an experimental model for development and evaluation of a curriculum for the New Quincy, Massachusetts, Vocational-Technical School (Ullery and Nicastro, 1970). The approach analyzed a large number of occupations related to the woodworking clusters or sub-families. Further analysis revealed common skills and knowledges.

Robinett, et al. (1970) designed a language guide for teachers of primary age Spanish background children who have limited control of standard English. The areas of social science, science and mathematics were drawn upon to integrate concepts into a set of oral language lessons which progress sequentially both conceptually and linguistically.

The Richmond Plan focuses on the results of a re-evaluation of the principles and practices of high school programs in the Richmond City Schools, California (Cogswell Polytechnical College, 1971). This project is designed to meet the specialized needs of "average" high school students in terms of higher education and to determine whether

a pre-technology high school program is possible. Financed by a grant from the Rosenberg Foundation of San Francisco, the pre-technical training program involved departments of English, science, mathematics, drafting and the shop areas functioning as a team. The researchers concluded that it is possible for a community college to accept the responsibility of developing a high school preparatory program leading to semi-professional offerings and still maintain educational agency requirements. The cost to the district for the program, once the teachers are trained, is not significantly greater.

This broad integration of mechanical knowledge of several industrial areas and of interdisciplinary problems and subjects is indicative of the extent the vocational subject areas are drawing upon, and drawing them out, to the problems learners encounter in employment.

Higgins (1969) states, "The watchword for education in the seventies is 'how'. Too long the 'what' has been a thorn in the side of curriculum designers and teachers". She goes on to give a flashback into history of current educational thought which emphasizes the contemporary considerations for the interdisciplinary approach as one form of learning environment. In this work concerning the disciplines, Higgins (1969) builds a learner wisdom which is the ability to make right decisions in personal and social affairs which requires both knowledge and intellectual skill. She advocates continuing the trend in team teaching leading to an even wider use of the interdisciplinary approaches in secondary courses, as well as for elementary school subjects.

By its policy statement on vocational education, the California State Department of Education (1965) provided areas for multidiscipline instruction for vocational education with stated instructional needs in basic economics, place of work in human affairs, organization and management of work in contemporary society, language and mathematics of work, organization and self-determination of workers, and loyalties and attitudes of workers toward employment and money handlings.

Vocational development is a must for all students, and all subjects should include vocational education. School subjects should support one another; vocational education teachers should be equal partners in education with other teacher planners.

K. Smith (1970) has studied federal legislation relevant to home economics education in her doctoral thesis at the University of Illinois. The trend has been toward more federal involvement in education with the states retaining most of the control. Social conditions appear to be a prime determiner for the composition of education and

seem to provide impetus for enactments of legislation. Home economics must broaden its hemisphere for interdisciplinary approach and it must reexamine, redefine, and readjust in terms of social changes and legislation if it is to be a viable aspect of the total education program.

Goals Orientation. Recent experimentation in interdisciplinary circles center upon goals orientation. Such orientation extends to both the vocational and academic goals for the learner.

The National League for Nursing (Neal, 1964) published a report of five pilot projects on diaster nursing preparation. The demonstration projects were made possible through sub-contracts with four institutions which indicated their interest in developing disaster nursing content for their nursing programs. The programs are described in detail in the reference material and included the explanation of the nursing comprehensive achievement test in disaster nursing.

Bregman, et al. (1967) developed materials for an elective course in consumer education for New York State Education Department. This interdisciplinary course would be offered in grade 12 to serve as a capstone to the efforts of social studies, business education, home economics, health education, and industrial arts in preparing citizens to be wise consumers. It was developed by a team of teacher consultants and curriculum specialists and was tested by classroom use and the appraisal of specialists from non-profit consumer organizations.

The first of two volumes on family financing presents school curriculum development as it relates to family finance and background for money management (Gibbs, et al., 1967). The interdisciplinary approach is based on philosophy, sociology, and psychology. It states that, "family finance can be integrated into established curriculums of home economics, economics, history, sociology, geography, health language arts, or any combination of these subjects".

Culbert, et al. (1968) provide a framework for curriculum development in the social studies area. Their goal is to present concepts and generalizations within the structure of knowledge of the social studies and the content based on interdisciplinary and cross-cultural approaches.

The core curriculum and mobility was presented by Turner (1968) at a symposium on paramedical education and career mobility at Evergreen Park, Illinois. The conference focused on two objectives, the first of which deals with the concepts of core curriculum and

career mobility. The second objective is new approaches to problems of health manpower shortages.

The ES '70 News (Educational System for the 70's, 1968) gives specifics of implementing the objectives of the Educational System for the Seventies Program. Briefly reviewed are: 1) The Study of Curriculum for Occupational Preparation and Education (SCOPE) at Rutgers; 2) The Atlanta School System's work on a student-oreinted secondary curriculum; and 3) The Triple "T" Project to encourage elementary and secondary schools and institutions of higher education to improve the "training of teachers".

Offerings of core curriculum in health on the 11th and 12th grade levels was one of six major topics on the agenda of the National Planning Association's annual meeting (Teeple, 1968).

Helping students to fulfill their potential, stimulate cultural interests, and develop abilities are seen by Portland Community College as best met by the basic community college program in transfer, career-vocational, adult, and general education. Wiegman (1969) states the case for much more student contact with the future employing community while the student is still in school in order that the school satisfy some of their basic needs.

The clustering technique has been used in Texas Public Schools (Texas Education Agency, 1969) as an interdisciplinary technique. Academic and vocational teachers prepared a curriculum guide for teacher use in planning and implementing a cluster of courses in home and community service occupations for students with special learning needs. A specific vocational goal was set, such as cleaning ledging areas. All training centered on that goal.

Julian N. Smith (1970) prepared a booklet to assist schools planning to initiate cluster programs and recommend improvements in existing programs. In the same area, Rhead's (1970, a. b) has prepared two units on Texas conservation. The first concerns each aspect of conservation; forests, wildlife, rangelands, water, minerals, and soil, and correlates these with secondary school curriculum areas. The second publication lists each of six instructional units with one aspect of conservation and correlates these with elementary school curriculum (1970a).

Viederman (1970) stresses an interdisciplinary program concerning the development of population education for other countries, which is flexible and stresses inquiry methods. Several countries such as Korea and Chile are involved with conceptual schemes for inferring population

education into the elementary and secondary social studies curriculum.

The subdivision of more specialized programs within the total business education curriculum was suggested in A Guide to Business Education in Florida Schools (Florida State Department of Education, 1967). For example, automatic data processing and basic business economics would be further subdivisions. On the other hand, each appropriate course would have a practical cooperative work experience opportunity.

Youth activities were discussed. The emphasis of the report was to demonstrate that certain sequences can be brought into vocational education as integral parts of a related curricular need to fulfill differing goals.

Agriculture also served as a broad term for widely divergent topics such as America's settlement, and rural culture, and philosophy. When used in this way, agriculture became a base for an integrated and core approach. A specific reference is the Point Pleasant Beach Board of Education, New Jersey, (1968) publication. The objectives of this problematic approach are to help students understand ideas of the relationship between man, the Industrial Revolution, and the effect of an agricultural way of life on the religious, social, economic, and political views of all of the people of the United States.

Vocational or avocational goal orientation played a part in the Baltimore City Public School Rehabilitation Program for Delinquent Girls (1968). The program goal for both summer and winter programs is toward the development of ability to adjust in society through academics, but with special emphasis on home economics and business education.

A systematic approach defining behavioral objectives and educational materials is indicated in the conference report of a regional AAJC meeting. Menefee and Smith (1970) indicate that "among several approaches, including better teacher preparation for wider use of learning devices and methods, is the need to prepare students to cope with a changing world of society and work".

Process Approach. There are many facets to, and forms of, interdisciplinary cooperation. Programs and projects with integration and fusion of curriculum between subjects are numerous. There are cooperative studies in the academic areas where English and social science, mathematics and science, economics, and other social sciences, history and art, are fused by the experts, specialists, and teachers. Most, if

not all of these, find commonalities in the cognitive domain and the efforts are from the logic of the learned. Similar approaches are present in fields such as English, where composition, linguistics, and literature are being combined into courses.

The vocational field has a great many studies in which commonalities are searched out and combined in both product and process. More emphasis is given to process, more to the affective domain, and more to skills required.

There are various ways in which content or subject matter of a teaching field is fused. In some studies the content is analyzed into its elements and attempts are made to integrate the generalizations or principles of two separate subjects. Most higher education studies reveal a fusion as to logic of the content--where one subject is a prerequisite or an explanation or a justification for the other. The two are then placed in a relationship reflecting such logic. Less frequently, subject matter is integrated on the basis of its use. This is most often a generic basis and is not from the logic of the learner or user. A more successful plan is to develop curriculum content on the basis of learner needs.

In the past, the delineation of content has received the greatest attention in curriculum development. The process view, which began to evolve in the early sixties, has been implemented with some success in several school systems across the nation.

The process view has in it a little of both the content and creativity views. The content view is concerned with the learning of facts, concepts, and principles, usually with a specific discipline orientation; while the creativity view is not conerned with any specific content but with the processes by which people create (Halfin, 1972).

Science--A Process Approach has been implemented in several schools with some measure of success. Unfortunately, however, there is no large body of experimental evidence which testifies to the effectiveness of the process approach. The limited research hints, rather than proves, that the learning of processes has been facilitated.

Schooling, to be effective, must be concerned with man's tangle with himself in his rendezvous in time and space. The scope of material from which the school might select in educating today's children and youth is so vast that new priorities must be established in conceptualizing the what and how that the school will teach, or the

educational enterprise stands to fall short in the meeting of educational objectives.

A conceptualization of the curriculum must encompass several ingredients (Berman, 1968). First, it must be based upon an adequate view of man--a conception that is broad enough to account for a wide range of behaviors. Second, the curriculum should provide among its activities those which are designed to give children and youth the opportunity to develop the competencies designated in the view of man. Third, the curriculum must establish its points of emphasis or priority. Without such emphases the curriculum becomes bland and does not provide for means of dealing with problems of conflicting interests.

Process-oriented persons have broad, rather than narrow or restricted, fields of vision. They utilize a wide range of intellectual skills such as comparing, analyzing, elaborating, and evaluating in solving problems. They can be compared to generators as opposed to parasites, to reconcilers of conflict rather than avoiders of conflict. Process-oriented persons are interested in the possible rather than the probable. They are often spontaneous as opposed to deliberate. When challenged to carry out worthwhile tasks they are zealous, extravagent, and fervent at times as opposed to being continuously moderate.

To improve vocational education, McCloskey (1968), documents an interagency effort of 29 summaries of component reports. The results answer four questions which specify considerable fertile ground for process-oriented education. The need to identify clusters of capabilities (concepts, knowledge, skills, and attitudes) that are widely useful in occupations, provides opportunities for youths who do not finish college. One of the four interrelated efforts defines the development and pilot testing of semi-instructional systems designed to help pupils acquire levels of cognitive and motor capabilities which are adequate for effective work.

Process--the cluster of diverse procedures which surround the acquisition and utilization of knowledge is, in fact, the highest form of content and the most appropriate base for curriculum change. It is in the teaching of process that we can best portray learning as a perpetual endeavor, and not something which terminates with the end of school. Through process, we can employ knowledge not merely as a composit of information but as a system for learning (Parker and Rubin, 1966).

Content, as the school specialist speaks of it, refers to the information which comprises the learning material for a particular

course or a given grade. The information may consist of a related body of facts, laws, theories, and generalizations, as in a traditional science course.

Process, in contrast, refers to all the random or ordered operations which can be associated with knowledge and with human activities. There are a variety of processes through which knowledge is created. There are also processes for utilizing knowledge and for communicating it. Processes are involved in arriving at decisions, in evaluating consequences, and in accommodating new insights. The scientist engages in what is perhaps the crucial process of his labor when he fabricates questions for which answers must be found. Process exists in an infinite variety of shapes and forms. Every process, whatever its character, necessarily must have a construct, and underlying scheme which provides order and direction (Parker and Rubin, 1966).

The literature cited below tends to support the process approach to curriculum development. The approach seems to be appropriate for both vocational and academic and, in the future, may be the key to integration and interdisciplinary cooperation within the existing educational programs.

Science--A Process Approach (Gagne, 1967) was developed by using logic to arrive at the process (or mode of inquiry) used by the scientist. This approach was sponsored by the National Science Foundation through the Commission on Science Education of the American Association for the Advancement of Science (AAAS).

In May 1962, the Commission on Science Education was established to implement the feasibility study of the AAAS. The Commission sponsored two eight-day conferences in the Summer of 1962 at Cornell University and at the University of Wisconsin. At these conferences, the participants--scientists, teachers, educators, and school administrators--decided that the materials to be studied should stress the processes of science, not science content alone. The conferences were influenced by a position paper on curriculum design by Gagne (Livermore, 1964).

Upon recommendation of the two conferences, the Commission prepared a "Statement of Purposes and Objectives of Science Education in the Schools" and a working paper, "The Individual Basis of Scientific Inquiry". The second paper, prepared under the direction of Gagne (1965) identified and defined the various processes, the basic skills and the knowledge which a child might be expected to have at each grade level.

The outcome of all these conferences was the identification of the following processes: 1) observing, 2) classifying, 3) measuring, 4) communicating, 5) inferring, 6) predicting, 7) using space-time relations, 8) computing, 9) formulating hypothesis, 10) operationally defining, 11) controlling and manipulating variables, 12) experimenting, 13) interpreting data, and 14) formulating models. These processes are in logical order and arranged hierarchically. For example, to classify, a person must be able to observe; formulate models, and do the other thirteen processes (Livermore, 1964:273).

The development and tryout of this program is a major experiment in education. There are three significant aspects of the experiment: 1) the student develops skill in using one process, 2) the objectives are clearly identified, and 3) provision for evaluation is built in (Livermore, 1964:271-281).

In this program, the content is not neglected; however, the primary thrust is to develop the child's skill in using processes.

> The research hypothesis for evaluating the approach is: An elementary science curriculum for grades K-6 can be developed so that ninety percent of the children tested and who were taught from the instructional materials will acquire at least 90 percent of the behaviors described as objectives (Walbesser and Carter, 1968:55).

It can be observed that the research hypothesis calls for less than one hundred percent of the children acquiring less than one hundred percent of the described behavior. The reason for this is that the study will cover a period of seven years in which the mobility of students can affect the outcome. It is also recognized that individual differences exist in the acquisition of knowledge.

Reliable measuring devices were constructed for the Walbessor and Carter study (1968) and they were administered for each of the processes covered. It was found that the research hypothesis was not supported for the first part of the instruction. Reasons or explanation given for this are that the 90/90 expectation is too high and the materials have not been sufficiently revised. The percentage acquisition increased for the students with the appropriate amount of exposure to the curriculum, but it did not reach the 90/90 level for all exercises. It was concluded that if science is to be a general education subject, then the 90/90 criterion level may have to be lowered.

Science--A Process Approach. (Gagne, 1967) has been implemented

in fifty-three schools in New York and Pennsylvania by the Eastern Regional Institute for Education (ERIE) with approximately 57,000 students involved in the program. Tests have been devised and evaluated to measure student attainment of the stated behavioral objectives. A recent study reported that 80 percent of the sample of students tested to respond correctly to the competency measure tasks (Andreas, et al., 1970).

In Wisconsin, the curriculum guide for science published by the State Department of Public Instruction recommends that Science--A Process Approach be implemented in the public schools of Wisconsin. The program is presently in operation in several schools within the state.

The Materials and Activities for Teachers and Children (MATCH) is a process-promoting curricula in the social studies. "A House of Ancient Greece," a curricular unit, is illustrative of the various units in the curriculum, and provides a good illustration of the teacher's role. The students simulate and archeological dig and reconstruct an ancient village based upon the observation and study of a sequence of interrelated objects and materials. The teacher does not provide information, but guides the students in ways of obtaining, organizing and utilizing information provided through simulated experiences (Cole 1969:254).

Man: A Course of Study (M,ACS), another social studies process-promoting curricula, was developed by the Educational Development Center at Harvard University. In this curriculum, students observe a number of films of baboon troops, without narration except for the natural sounds of the baboons. The students make their own observations, hypotheses and inferences from the field notes of the anthropologist Irven Devore. According to Bruner (1966), what the children see and hear is how little DeVore knew about the baboons, but who eventually learned a great deal through observation, recording and reorganization of data. The students first apply the strategies and teachings learned to their understanding of the baboon troop. Then they apply it ot the social organization of human groups of actual or simulated cultures. The curriculum is concerned with the behavior and interaction of humans, their social organization, and their value systems. The ultimate aim of the approach is to sensitize the student to the nature of value systems and to recognize them as useful products of the minds of men rather than an absolute value system which is used to judge others. In addition to the theme on social organization, there are themes based upon language, tool-making, child rearing and world view (Bruner, 1966).

The Minnesota Mathematics and Science Teaching Project (Minnemast) stresses such scientific operations as observation, measurement, experimentation and experimental design, description, generalization and deduction (Minnemast, Science Program n.d.). Experiences provide the students with tools to seek out information and to build relationships and understanding of mathematics and science. It is proposed that the students are to "become scientists in viewpoint and to attach each learning task in science, armed with the elements of process useable by the child and pertinent to the problem" (Minnemast, n.d.). Units have been prepared for kindergarten through the sixth grade, and materials have been prepared to train teachers. Since all the materials provided for the teacher have been tested in typical classroom situations, it is not difficult for the knowledgeable teacher to vary the materials according to the student's ability or background. Work sheets are provided for the student to enter data, draw structures, and visualize ideas. The work sheets are accompanied by specially written stories which raise questions and incorporate important ideas. That mathematics enhances the student's ability to understand his physical and biological environment and that mathematical concepts arise out of scientific investigation is the program rationale (Frost and Rowland, 1969).

The literature above has related to the content and the process view. In the past, the delineation of content has received the greatest attention in curriculum development. The process view, which began to evolve in the early sixties, has been implemented with some success in several school systems across the nation. For example, Science--A Process Approach (Gagne, 1967) has been implemented in several schools with some measure of success. Unfortunately, however, there is no large body of experimental evidence which testifies to the effectiveness of this approach. The limited research hints, rather than proves, that the learning of processes has been facilitated.

Several action verbs are available in the literature to aid in inferring the processes. Some of the processes are: preparing, manipulating, verifying, symbolizing, idea-producing, fact-finding, communicating, decision-making, planning, forecasting, perceiving relationships, predicting, observing, visualizing, modeling, measuring, organizing, valuing, loving, creating, knowing, identifying, distinguishing, describing, demonstrating, constructing, classifying, inferring, computing, using space/time and manipulating variables, experimenting and interpreting data.

PROJECTIONS

If education was future-oriented, it would focus on man as an individual and on the central issues confronting him as he exists in the society (DeVore, 1969). In the past, the delineation of content has received the greatest attention. On the horizon, as a result of curriculum research and the influence of scholars in the various disciplines, the process approach to education has begun to evolve (Halfin, 1972). The process approach, as it will be used in the future, will focus on the central issues confronting man, and will replace the old approaches to education (Courtney, 1972).

The three targets of learning which have appeared on the educational scene are knowledge, attitudes, and intellectual skills. It can be recognized that only the target of knowledge can be implemented through the content structure which we presently follow. The other two depend heavily upon process. Through a taxonomic structure of content and a taxonomy of processes, it may be possible to group learning experiences so that the student may develop higher order intellectual skills (Halfin, 1972).

Several process curriculums have been implemented across the country with some measure of success. Unfortunately, however, there is no large body of experimental evidence which testifies to the effectiveness of this approach (Halfin, 1972). The limited research only hints that the learning of processes has been facilitated. Still, process learning holds much promise for solving our present educational structure problems and may well become the structure of the future.

Related somewhat to the process element is the growing awareness of educators to performance-based objectives. Not only can learning be accountable to the learner and the community, but the processes of solid learning techniques can be taught through the method of actual presentation. Many learning packages are developed through the subjects from other disciplines. Although some learning packages will be unique and specifically designed for vocational education, others will prepare teachers with teaching skills applicable to all areas of learning.

A philosophical base for more comprehensive core foundations approach for prospective teaching calls for greater integration of disciplines (Laska, 1969). Yet, each discipline should maintain academic integrity. Independent institutional fields are still dependent to a considerable extent upon the fields of knowledge and, in behavioral science and the humanities, for methods and general concepts. A drawback for prospective teachers has been the method of

gaining proficiency in isolated areas of, say, "philosophy of education" or psychology of education". They have not been exposed systematically to the total body of knowledge in the foundations of the education fields, and consequently, lack the philosophical base required of the profession.

Cotrell (1970), with the "Model Curricula for Vocational and Technical Education", initially identified 237 performance requirements or elements which were rated for each vocational service and analyzed to determine the common and unique elements. Very few differences were found between the common and unique elements important to secondary and post-secondary teachers. More recently, new elements have been discovered and 140 others have been listed as important. These will be used to design performance-based modules for vocational teacher education, but with the common knowledge of applicability to general education. Many of the elements demand general education skills including the exchange of personnel between schools and private enterprises. Institutes and other preservice and inservice training programs for vocational education are supplemental programs.

Withycombe (1972) reports on an off-campus personnel preparatory program for disadvantaged learners in the Portland Urban Teacher Education Project (PUTEP). Since its beginning in 1969, PUTEP has been involved in the recruitment and training of 60 adults for teaching positions in the urban, inner-city schools of Portland, Oregon. In each year, the goals have to certify black and other minority teachers and to provide instruction to the economically and socially disadvantaged students attending schools in the urban center. During the three full years of PUTEP's existence, the project has received both local and national recognition as an exemplary field-based teacher education project. Most recently, a detailed description of PUTEP was included in the report of the Study Commission on Undergraduate Education and the Education of Teachers, National Center for the Improvement of Educational Systems, U.S. Office of Education. The training objectives of PUTEP involved the development of a flexible, coherent, integrated certification program. The various theoretical courses were designed to be interdisciplinary and carefully dovetailed with practical experiences.

The Texas Teacher Education and Certification Project (Howsam, 1972) has fostered several recommendations since 1969, some of which have been implemented. Four teacher centers were established which provide the design and pilot testing for performance-based teacher education. Teacher training institutions provide faculty members who serve nine months at any one of the four centers. This enables the free flow of ideas. One component of the Center's project is the

Texas Education Renewal Center (TERC) which insures technical and developmental assistance to the network of teacher centers. These act as a delivery system for new and improved educational products and practices.

Performance-based teacher education (PBTE) is well suited to performance-based instruction. It is consistent with the principle of specific activity for developing the means to meet objectives.

Venn (1969) reports that Title II of the Vocational Education Amendments of 1968 amends EPDA (The Educational Professional Development Act) with a new section "F" called "Training and Development Programs for Vocational Education Personnel". In addition to appropriations for leadership development awards, the amended act authorizes the commissioner of education to make funds available to state vocational education boards. This money can be used for programs involving an exchange of personnel between schools and private enterprises. Institutes, preservice, and inservice training programs for vocational educators and others entering or reentering the field are fundable under Part "F", Title II.

The idea that the university prepares and produces teachers and that the public schools consume them is being modified. The myth, assigning teacher education as the sole responsibility of educational agencies, has been exploded. Teachers and other educational personnel are being prepared by cadres of professionals in off-campus complexes involving the private sector.

Maddox (1972) illustrates how one teacher education center in West Virginia is working to utilize the expertise of community volunteers, clinical teams, and specialists from several fields. The program links university, public schools, and other community agencies in order to function in an off-campus setting. The preparation of well trained, effective and committed educational personnel to this task is a sound base upon which to build an inner-city educational program. Clothier (1972) reports that to develop competent teachers who understand the problems of ghetto life and the learners whom they teach, it is important to utilize off-campus resources. The campus is a place where this can be done. Brooks E. Smith, et al. (1968) advocates preparing teachers for the real world in just such an environment. The training program requires easy access to children, youth, and adults who represent a wide variety of cultural orientations and racial origins. The problems associated with such programs call for the knowledge of specialists in both the academic and vocational fields.

The world of work becomes an integrating influence. The concept of the business (labor, industrial, education: community actively cooperating in the education of learners of many ages requires a marriage of academic and vocational education. Resource persons from the business-labor-industrial community must be working in schools and classrooms. The classroom must be expanded to include the office, the shop, and the marketplace. Work experience, work study, and work placement programs must be easily accessible to teachers and learners. Counselors, supervisors, and administrators must have meaningful work experiences during school and off-school hours. Banta and Marshall (1970) expand on techniques for synthesizing school and work in "Bringing Schools and Industry Together." Legislators like Pucinski (1971) are precise about the essential changes in attitudes, financing, and cooperative relationships. Venn (1970) places education directly between man and manpower in an effective in-school and out-of-school arrangement.

The working world provides the environment for more than knowledge or process; it adds purpose. Bruner (1971), who ten years ago stressed the process of education, now calls the decade one of enormous change in perspective and emphasis of educational reform. He is now quite satisfied with a de-emphasis on the structure of knowledge, and deals with it in the context of problems that face us. He would put vocation and intention back into the process of education. The concept of work and the real working world provides the idea of the laboratory and community resources for assisting the school. Perhaps cybernetics will someday loosen the hold of the work ethic in society. However, people presently obtain not only their economic rewards but also much of their identity, their social contacts, and their sense of accomplishment through work.

FINALE

During the sixties and early seventies, it has become increasingly popular to discuss interdisciplinary and multidisciplinary approaches. This study reveals that advocates have engaged in more than rhetoric.

Interdisciplinary efforts have increased in both academic and vocational education. Teams have operated in diagnostic centers, teaching complexes, career education, and community schools. Dedicated professionals who are committed to this concept are demonstrating aggressive leadership in legislative bodies, classrooms, and professional organizations. The concept of sharing bodies of knowledge in effectively attacking the complex problems of a learner is a noble contribution in the helping professions.

Where problems become more complex, it becomes logical to unite professionals of multidisciplines in a concerted effort. Barsch (1971) indicates that interdisciplinary strategy is often limited to extensive diagnostic efforts, while multidisciplinariness does not deal exclusively with diagnosis, but is also relevant to therapy. Full potential of the individual and combined wisdoms of many professionals is thus obtained.

Changes occur as these inter- and multi-efforts evolve. Resolution of disciplinary provincialism, negative or positive attitudes toward the value of advanced degrees, and outright intellectual snobbery is taking place. There is sufficient evidence to indicate that efforts to relate academic and vocational education is helping solve and resolve long overdue problems faced by learners of every age. Full implementation of the concept will restore much of the faith of this public in the educational enterprise.

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